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10/566,326	01/27/2006	Haruhiko Murase	4344-060126	3518

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EXAMINER

HWU, JUNE

ART UNIT	PAPER NUMBER
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1661

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/566,326	Applicant(s) MURASE ET AL.	
	Examiner JUNE HWU	Art Unit 1661	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 3-8 and 21-32 is/are pending in the application.
- 4a) Of the above claim(s) 1, 2 and 9-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 3-8 and 21-32 is/are rejected.
- 7) ☒ Claim(s) 27-30 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

The amendment to the claims filed on August 29, 2008 is acknowledged and entered.

Status of the Claims

Claims 1, 2, 9-20 are withdrawn; claims 3-8 and new claims 21-32 will be examined on the merits.

The previous objections and rejection have been withdrawn due to Applicants' amendment of the claims.

Objections to the Claims

Claims 27-30 are objected to because of the following informalities:

The botanical names for *Bryopsida* and *Racomitrium canescens* should be italicized or underlined because they are Latin names.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3-8 and 21-32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Dependent claims are included in all the rejections.

Claims 3, 4, 21 and 22 are unclear because claim scope is not limited by claim language (e.g. "whereby") that suggests or makes optional, but does not require, steps to be performed. The Court in *Hoffer v. Microsoft Corp.*, 405 F.3d 1326, 1329, 74 USPQ2d 1481, 1483 (Fed. Cir. 2005) noted that a "whereby clause in a method claim is not given weight when it simply

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expresses the intended result of a process step positively recited" (quote cited from *Minton v. Nat'l Ass'n of Securities Dealers, Inc.*, 336 F.3d 1373, 1381, 67 USPQ2d 1614, 1620 (Fed. Cir. 2003)). See MPEP 2111.04. Thus, the "wherein" clause is not given weight because it cites an intended result of a process step.

Claims 25 and 26 recites the limitation "said phytohormone" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3, 21, 23, 25, 27, 29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraoka et al (U.S. Patent No. 5,476,523) in view of Calie et al (Plant Molecular Biology Reporter (1987) vol. 4, no. 4, pp. 206-211) in light of Collier et al (Journal of Tissue Culture Methods (1982) vol. 7, no. 1, pp. 19-22). The rejection is modified from the rejection set forth in the Office action mailed April 29, 2008, due to Applicants' amendment of the claims.

The claims are drawn to a method of producing young moss seedlings by growing the moss seedlings, wherein gametophytes having leafy gametophytes of moss in a nutrient solution stirred by bubbling via pumping of a gaseous body including oxygen at a temperature range of 0-60°C and photosynthetic active photon flux density (PPFD) is not greater than 200 $\mu\text{molm}^{-2}\text{s}^{-1}$ into the solution with phytohormones.

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Hiraoka et al teach a method of culturing moss tissues such as stems, leaves, etc. which would include gametophyte (col. 9, line 1). A gametophyte is described in the specification as having a leafy gametophyte (p. 9 of instant specification). Hiraoka taught that the young moss seedlings are plants of *Bryopsida* including *Racomitrium* (col. 5 bridging to col. 6). The moss tissues or gametophytes are cut and sterilized and cultured in a 1/5 NA-MS culture media (liquid) containing 0.1-10 μM of growth control substance (phytohormones) at a temperature of 20-25°C, which is between 0-60°C for 30 to 60 days while shaking at 110-120 rpm/min and illuminating a light of about 1000-3000 lux (col. 9, lines 8-12). The nutrient solution may contain kinetin (cytokinin), benzyladenine (cytokinin), indole-3-acetic acid (auxin), 2,4-dichlorophenoxyacetic acid (2,4-D) (auxin), etc. (col. 3, lines 42-48). The conversion of 1000 lux to 3000 lux is between $12.1 \mu\text{molm}^{-2}\text{s}^{-1}$ to $36.3 \mu\text{molm}^{-2}\text{s}^{-1}$ under cool white fluorescent lamp, which is not greater than $200 \mu\text{molm}^{-2}\text{s}^{-1}$. The moss tissues eventually grew into moss seedlings for moss garden, moss pot etc. which would include moss for greening (col. 11, lines 30-31).

Hiraoka et al do not teach that the leafy gametophytes of moss are stirred by bubbling via pumping of gaseous body including oxygen into the solution.

Calie et al teach a method of culturing moss in nutrient medium under constant illumination and aeration by bubbling 2% CO_2 enriched atmosphere at 20°C (p. 207), which would include oxygen. The nutrient medium is Knops stocks solution, Nitch's minor elements stock solution and Ferric citrate stock solution (p. 207 and Collier and Hughes, 1982).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the method of producing young moss seedlings as taught by Hiraoka with the method of stirring by bubbling via pumping gaseous body including oxygen as taught by Calie because Calie taught that the growth of moss tissue with aeration by bubbling 2% CO_2 enriched

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atmosphere at 20°C produced moss tissue (p. 207), which would include oxygen. With regard to bubbling via pumping, the bubbling of the CO₂ in the culture is actually being pumped into the culture and the pumping cause culture to be stirred. One of ordinary skill in the art would have been motivated to do so given that mosses have recently been popular for moss gardens, roof garden and traditional Japanese gardens (Hiraoka col. 1, lines 20-25). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Hiraoka in view of Calie in light of Collier because the production of moss seedlings would be a choice of experimental design and is considered within the purview of the cited prior art.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had reasonable expectation of success in producing the claimed invention. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made as evidenced by the cited references.

Claim 4 remains rejected and claims 22, 24, 26, 28, 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraoka et al in view of Meyer (American Journal of Botany, 1940; 27(4): 221-225). The rejection is modified from the rejection set forth in the Office action mailed April 29, 2008, due to Applicants' amendment of the claims.

The claims are drawn to a method of producing and growing the young moss seedlings, wherein gametophytes having leafy gametophytes of moss are grown in nutrient solution by aerating and stirring by bubbling a gaseous body including oxygen, within the temperature range of 0-60°C and photosynthetic active photon flux density (PPFD) not greater than 200 $\mu\text{molm}^{-2}\text{s}^{-1}$ into the solution with phytohormones.

The teachings of Hiraoka are discussed above.

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Hiraoka et al do not teach that the leafy gametophytes of moss are grown in a nutrient solution by aerating and stirring by bubbling a gaseous body including oxygen into the solution.

Meyer teaches a method of developing leafy gametophytes of *Physcomitrium turbinatum* (Urn Moss) in liquid media. Mature capsules of Urn Moss were opened by sterilized needles and the spores were scattered on the nutrient solution (Benecke's solution and Detmer's solution (p. 221, right col. 1st full par.)). After germination the protonemata were transferred to a nutrient culture in Erlenmeyer flask containing 100 cc. of solution (p. 222, left col. 1st par.). The nutrient solution was changed once a month, thus allowing air, which includes oxygen into the flask, intermittently (p. 222, left col., 1st par.). The cultures were rotated at frequent intervals so the protonemal threads would not stick to the bottom or sides of the flask. At this point the rotation of the culture is being stirred. Gas bubbles that accumulated along the filaments were freed by using a glass needle so that the protonemata would not float to the surface (p. 222, left col. 1st par.). By using the glass needle to free the filament, the culture is being stirred. The cultures were kept at normal laboratory temperature and the light source was an artificial cool light (p. 222, left col. 2nd par.). The conversion of an artificial cool light is $36.3 \mu\text{molm}^{-2}\text{s}^{-1}$, which is under $200 \mu\text{molm}^{-2}\text{s}^{-1}$. The average room temperature of 20-25 °C is between 0 to 60°C.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of producing and growing young moss seedling as taught by Hiraoka et al and to combine that method by having the leafy gametophytes of moss grown in nutrient solution by aerating and stirring by bubbling a gaseous body including oxygen as taught by Meyer because the rotation of the culture causes air or oxygen to be stirred into the culture. Meyer et al taught that the filaments in the flask were probably stirred so that the protonemata would not float to the top of the surface. By stirring the culture as taught by Meyer, bubbles would form, as a result a gaseous body including oxygen is in the solution. One of ordinary skill

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in the art would have been motivated to produce young moss seedling because mosses are important for the environment in that when excessively removed from forests and mountains by collectors the ability of the forests and mountains to retain water would be low, thus causing landslide, flooding, etc. (col. 2, lines 14-18 of Hiraoka et al). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of producing and growing moss seedling as taught by Hiraoka et al and aerating and stirring by bubbling the gaseous body including oxygen as taught by Meyer because both Hiraoka and Meyer produced growth of young moss seedlings.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had reasonable expectation of success in producing the claimed invention. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made as evidenced by the cited references.

Claims 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraoka et al in view of Calie et al in light of Collier et al, and further in view of Sabovljevic et al (Turk. J. Bot. 27 (2003) 441-446). The rejection is modified from the rejection set forth in the Office action mailed April 29, 2008, due to Applicants' amendment of the claims.

The claim is drawn to a method of producing young moss seedlings, wherein leafy gametophytes are cultured in nutrient solution stirred by bubbling via pumping of a gaseous body which including oxygen and further growing the moss by repeating light periods and dark periods in cycles of 24 hours or less duration.

The teachings of Hiraoka et al in view of Calie et al in light of Collier et al are discussed above.

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Hiraoka et al in view of Calie et al in light of Collier et al do not teach that the moss is grown by repeating light periods and dark periods in cycles of 24 hours or less duration.

Sabovljevic et al taught a method of growing moss by culturing apical shoots of the gametophytes of *Eurhynchium praelongum* (p. 442, right col. 1st full par.). The apical shoots were sterilized and transferred to a Petri dish containing 20 ml basal medium (p. 442, right col., 2nd full par.). The cultures were grown at 25°C, which is between 0-60 °C and under cool-white fluorescent light (33.5-45 mmol/sm² irradiance) and day/night cycles of 16/8 hours (p. 443, left col., 1st par.). The plants were subculture at one month interval. Secondary protonema developed in 3 months after *in vitro* culture in MS₁ (p. 443, right col. 1st full par. and Table 2).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of producing young moss seedlings as taught by Hiraoka et al in view of Calie et al in light of Collier et al and to combine it with the method of repeating light/dark periods as taught by Sabovljevic et al because light/dark regimes benefited the production of young moss seedlings. One of ordinary skill in the art would have been motivated to do so given that 40% of the moss species are endangered and there is a need to protect them and one way is by reproduction (Sabovljevic et al, p. 442, left col., 1st par.). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of producing young seedling moss as taught by Hiraoka in view of Calie in light of Collier and growing the moss by repeating light/dark periods as taught by Sabovljevic because both produced young moss seedlings.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had reasonable expectation of success in producing the claimed invention. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made as evidenced by the cited references.

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Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraoka et al in view of Meyer, and further in view of Sabovljevic et al (Turk. J. Bot. 27 (2003) 441-446). The rejection is modified from the rejection set forth in the Office action mailed April 29, 2008, due to Applicants' amendment of the claims.

The claim is drawn to a method of producing young moss seedlings by growing young moss seedlings, wherein leafy gametophytes are cultured in nutrient solution by aerating and stirring by bubbling a gaseous body including oxygen and further growing the moss by repeating light periods and dark periods in cycles of 24 hours or less duration.

The teachings of Hiraoka et al in view of Meyer are discussed above.

Hiraoka et al in view of Meyer do not teach that the moss is grown by repeating light periods and dark periods in cycles of 24 hours or less duration.

The teachings of Sabovljevic et al are discussed above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of producing and growing young moss seedlings as taught by Hiraoka et al in view of Meyer and to combine it with the method of repeating light/dark periods as taught by Sabovljevic et al. One of ordinary skill in the art would have been motivated to do so given that 40% of the moss species are endangered and there is a need to protect them and one way is by reproduction (Sabovljevic et al, p. 442, left col., 1st par.). Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of producing young seedling moss as taught by Hiraoka in view of Meyer and growing the moss by repeating light/dark periods as taught by Sabovljevic because both produced growth of mosses. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

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From the teachings of the references, it is apparent that one of ordinary skill in the art would have had reasonable expectation of success in producing the claimed invention. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made as evidenced by the cited references.

Claims 3 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraoka et al in view of Calie et al in light of Collier et al, and further in view of Virtanen et al. The rejection is modified from the rejection set forth in the Office action mailed April 29, 2008, due to Applicants' amendment of the claims.

The claim is drawn to a method of producing young moss seedlings, wherein leafy gametophytes are cultured in nutrient solution stirred by bubbling via pumping of a gaseous body which including oxygen and further comprising the fertilizer concentration in the nutrient solution is 0 to 1.0 (mS/cm).

The teachings of Hiraoka et al in view of Calie et al in light of Collier et al are discussed above.

Hiraoka et al in view of Calie et al in light of Collier et al do not teach that the fertilizer concentration of said nutrient solution is 0 to 1.0 (ms/cm).

Virtanen et al taught effects of fertilizer in bryophyte biomass. Virtanen et al taught that bryophyte biomass was greater when farm yard manure and fishmeal were applied to the plot (p. 133, left col., last par., p. 139, left col., 1st full par. and Fig. 1). Farm yard manure and fishmeal are both fertilizers.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of producing young moss seedlings as taught by Hiraoka in view of Calie in light of Collier and to combine the method of fertilizing the moss seedling as taught by

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Virtanen et al because the addition of fertilizer such as farm yard manure and fishmeal aided in the production of young moss seedlings. Virtanen et al are silent to the concentration of fertilizer but it would have been obvious to one of ordinary skill in the art to adjust the amount of fertilizer concentration to achieve the desired results, more moss seedlings. Moreover, Virtanen et al have shown that bryophyte biomass increased when farm yard manure and fishmeal were applied. One of ordinary skill in the art would have been motivated to do so given that fertilizing young moss seedlings benefited the production of young moss seedlings. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Hiraoka in view of Calie in light of Collier and further in view of Virtanen because the production of moss seedlings would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had reasonable expectation of success in producing the claimed invention. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made as evidenced by the cited references.

Claims 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiraoka et al in view of Meyer, and further in view of Virtanen et al. The rejection is modified from the rejection set forth in the Office action mailed April 29, 2008, due to Applicants' amendment of the claims.

The claim is drawn to a method of producing young moss seedlings by growing young moss seedlings, wherein leafy gametophytes are cultured in nutrient solution by aerating and

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stirring by bubbling a gaseous body including oxygen and further comprising the fertilizer concentration in the nutrient solution is 0 to 1.0 (mS/cm).

The teachings of Hiraoka et al in view of Meyer are discussed above.

Hiraoka et al in view of Meyer do not teach that the fertilizer concentration of said nutrient solution is 0 to 1.0 (ms/cm).

The teachings of Virtanen et al are discussed above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the method of producing and growing young moss seedlings as taught by Hiraoka in view of Meyer and to combine the method of fertilizing the moss seedling as taught by Virtanen et al because fertilizing increased the biomass of mosses. Virtanen et al are silent to the concentration of fertilizer but it would have been obvious to one of ordinary skill in the art to adjust the amount of fertilizer concentration to achieve the desired results, more moss seedlings. One of ordinary skill in the art would have been motivated to do so given that mosses play an important role in water retention of forest and mountainside and their disappearance would affect the ecosystem. Furthermore, one of ordinary skill in the art would have a reasonable expectation of success in the combination of Hiraoka in view of Meyer and further in view of Virtanen because the production of moss seedlings would be a choice of experimental design and is considered within the purview of the cited prior art. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made.

From the teachings of the references, it is apparent that one of ordinary skill in the art would have had reasonable expectation of success in producing the claimed invention. Thus, the invention as a whole was clearly *prima facie* obvious to one of ordinary skill in the art at the time the invention was made as evidenced by the cited references.

Conclusion

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to June Hwu whose telephone number is (571) 272-0977. The Examiner can normally be reached Monday through Thursday from 6:00 a.m. to 4:30 p.m.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Anne Marie Grunberg, can be reached on (571) 272-0975. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

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applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/June Hwu/

/Cynthia Collins/

Primary Examiner, Art Unit 1638